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IMPROVED TENT FOR M-577 COMMAND TRACK

by

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) In June 1972, a Product Improvement Meeting on the M-577 Command Track was held at the US Army Combat Developments Command Armor Agency, Ft Knox, KY. One of the many improvements discussed was the redesign of the vehicle tent extension. USALWL initiated a task to improve this structure by simplifying the erection and dismantling procedures, providing a quick release capability and reducing overall weight of tent extension. The improved M-577 tent  CON'T		

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extension designed and developed by USALWL is lightweight, quickly erectable and can be detached from the M-577 track within minutes. In addition the structure can be left freestanding when the command track is detached. Presently four prototype units are being evaluated by TECOM at Ft Knox, KY.

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## INTRODUCTION

The M-577A1 Light-Tracked Command Post Carrier is designed for use as a highly mobile field command post. The tent extension, erected from the rear of the vehicle, increases working space and provides weather and blackout protection.

The present tent extension is heavy, bulky, difficult to erect and must be completely disassembled before the vehicle can be moved. It was pointed out during the product improvement meeting held on 28-29 June 72 at CDC Armor Agency, Ft Knox, KY that reduced weight should be a prime consideration in the redesign of any new equipment based on the fact that the present swim capability of the M-577A1 is marginal. Simplicity of erecting and disassembling of any new structure was also stressed.

USALWL's new tent extension can be erected by two men within 15 minutes, in the event of an emergency, detached by one man in 60 seconds, and has an overall weight reduction in excess of 25%. The present standard tent requires four men working as a team approximately 20 minutes for erection and 20 minutes for striking. The USALWL tent comes equipped with an optional ground cloth, has provisions for utilizing the Army M1941 stove and incorporates a tunnel feature at each entrance which provides for ease of aligning additional structures as required by the Tactical Operation Center (TOC).



## DISCUSSION

Prior to initiation of work on this task, a group of USALWL engineers were assembled for a brainstorming session. Although the size of the present shelter was acceptable, it was anticipated that ideas originating from this session would lead to a much lighter and simpler tent extension. Based on this meeting, the following USALWL performance and physical military characteristics were prepared:

1. The tent must be suitable for use in all climatic and weather conditions in categories I through VI.
2. Two men must be able to erect and/or take down and stow the entire structure in 5 minutes.
3. In the event of an emergency, the structure must be capable of being detached from the M-577 by one man in 60 seconds.
4. The tent must be capable of being connected to other like units forming a Tactical Operations Center (TOC).
5. Including the floor, the weight must be significantly less than the present structure.
6. The structure must be freestanding when erected and, if possible, have all support integral (captive) to prevent loss.
7. The tent must provide at least the same amount of interior space as the present structure, with provisions made for map boards, radios, lights and stove installation.
8. The tent must conform to current Army directives relative to light discipline and camouflage.
9. The tent must not interfere with the normal operational capabilities of the vehicle, to include raising and lowering of the ramp, and vehicle swimming.

The USALWL improved shelter consists of a three-sectional frame, the fabric tent and fabric ground cloth. The frame is fabricated from aluminum tubing and can be folded into three sections for storage on the rear of the vehicle. Prior to erecting the frame, the frame is laid out on the ground (see Figure 1). The frame is color-coded for ease of assembly and the sections are joined using ball-type locking pins. Six telescoping poles form the legs and have anchoring plates attached at the bottom. The entire structure can be anchored to the ground using the twelve tent stakes provided. These stakes are driven through the holes in the base plates at approximately a 45° angle. The total weight of the new frame is 70 pounds compared to the 114 pounds of the original structure.



Figure 1. Frame Prior to Erecting



The tent fabric is a PVC-coated 11 oz/sq yd nylon material. The fabric is flame-resistant, blackout-proof, protected from ultraviolet, olive drab in color and is serviceable in temperatures ranging from 180° to -65°F. To provide for adequate ventilation and to prevent condensation from forming in the interior of the tent, the walls of the tent have been perforated. The holes are so small that they are hardly visible to the naked eye; however, they provide sufficient ventilation for the material to breathe. The tent extension has a breakaway feature which allows for the removal of the command track without disrupting the TOC. This can be accomplished by simply pulling on a rope located above the rear ramp center (see Figure 2) and removing two locking pins from the fitting which attaches the frame to the vehicle. Although the breakaway section will trail behind the vehicle, if time permits, the section of fabric below the ramp should be removed and attached to the vehicle to prevent the material from becoming snagged and possibly torn. Another feature incorporated in the new structure is the 6" tunnel or flap which is sewn around the three large openings. This has been added to simplify aligning of structures when a TOC is being formed. The improved tent has a blackout proof entrance, stovepipe outlet and an optional ground cloth. The ground cloth is attached to the main tent by a hook-and-pile strip which has been sewn around the perimeter of the tent and ground cloth. To prevent the fabric from flapping or lifting during windy conditions, grommets are provided at the base of the tent to anchor the fabric to the ground. Grommets and tabs have also been provided at the leg locations and should be placed under leg base plates making sure the ground point is through the grommet. Although the new structure looks similar to the original tent extension (see Figure 3) it is lighter, weighing 113 pounds compared to 177 pounds of the present structure, has a double peak roof to prevent water from accumulating and causing pockets of water to form, and is much simpler to erect.

Two field modifications are required before the improved structure can be used on the command track. The modifications which are part of the overall package consist of two swivel type connectors which replace the original connectors used to attach the tent extension frame to the command vehicle (see Figure 4) and two new frame racks. The only difference between these connectors is the addition of a 1/4" hole in the 2" dia. hub. This hole is used to attach the frame to the track using the ball type fitting provided on the frame. The new frame racks use the existing attachment holes which are used to attach the present frame rack. The tent extension cover is attached to the vehicle using the bar type strip at the top of the vehicle. Prior to attaching the tent extension to vehicle, the cover is folded around the attaching cord. The cord is then slipped under the bar strip and tightened in place. This section of the tent extension remains in place at all times. When the tent is rolled for storage, the cover flap hanging at the rear of the vehicle is brought up over the roll, the ends of the cover folded into the center of the roll and the remaining section of cover wrapped around the tent extension. The tent is secured in place using existing straps (see Figure 5).





Figure 2. Quick Disconnect Feature





Figure 3. Erected Structure



Figure 4. Swivel Type Connectors



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Figure 5. Tent Extension Stowage



## Testing

During the development of the tent extension it was established that guy ropes used on any tent, are hazardous and should be eliminated if possible. Using a UH-1D helicopter to develop wind gusts the structure was secured in a freestanding state using various anchoring methods to determine if the elimination of ropes was possible. Three methods of anchoring were tested and evaluated:

a. Standard guy ropes and stakes. The standard method of anchoring tentage is with guy ropes and stakes. Using this method, the M-577 shelter was anchored in a freestanding state with 10 guy ropes (see Figure 6). The helicopter was flown around the structure developing winds of 50 mph. Although the structures remained in tact while the helicopter circled around the perimeter, the structure collapsed when the helicopter flew directly overhead due to a suction created by the helicopter which lifted the structure and caused the legs to collapse.

b. Guy ropes and stakes and anchoring of the six frame supports to the ground. Using this method, the structure remained standing during the test although zippers were damaged as a result of the fabric flapping and not being secured.

c. Anchoring of the six frame supports and the tent fabric to the ground (no guy ropes). This method which was our ultimate goal, proved feasible and is used in our improved shelter design.

In addition to the anchoring tests, erecting and striking of the structure was carried out to determine the time and number of people required to complete each operation. Two trained people can erect and anchor the structure within five minutes. Striking of the structure requires approximately 10 minutes. A third man would make the operations much easier.

The improved shelter is scheduled to be tested by US Army Armor & Engineer Board, Ft Knox, KY under US Army Test & Evaluation Command Project No. 1-VC-019-577-001.



Figure 6. Extension in Freestanding State



## CONCLUSIONS

1. The entire M-577 Command Track Tent has been simplified and can be erected and dismantled by two men within 10 minutes.
2. The overall weight of the improved tent has been drastically reduced.
3. Emergency detachment from the M-577 Command Track can be accomplished by one man in sixty seconds, a capability not presently available on the standard tent.

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